

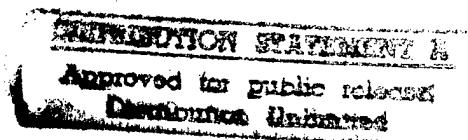
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# The Weaponry Revolution

by Jon Clemens, Managing Editor

"...During the Yom Kippur War, it appeared in a man-portable form. Arab soldiers with what looked like suitcases dispersed themselves across the battlefield, opened the cases, and proceeded to launch small but destructive missiles at Israeli tanks with great effect....Weighing only 11 kilograms at launch, Sagger had a range of 3,000 meters and a 120-mm diameter shaped charge which was highly effective...."

Wars come upon us periodically, while technological change is constant. In hundreds of examples throughout military history, soldiers have been surprised and often stymied by weapons they were never trained to encounter, the tank itself being but one example. Their armies may have known a new weapon was in development, but until they encountered the weapon on the battlefield, gauged its potential, and suffered its effects, the power of surprise to shock and stun has frozen soldiers into ineffectiveness.

Recent articles in ARMOR suggest that just such a series of changes is brewing, changes that will affect us as much as our potential enemies. As armies adopt these weapons, they will force revisions in doctrine, tactics, and training. The key new technologies include:

- Top Attack--Weapons that fly over targets, and fire down on the more vulnerable top armor of turrets and hulls. Missiles that do this have been in production for some time, but have not yet been widely used. Also on the way, thanks to microelectronics, are tank and artillery rounds that do much the same thing. The implications are staggering and global.
- Fire and Forget Man-portable Missiles--Facing the unarmored infantryman who is engaging with a shoulder-fired missile, tank crews once took advantage of the missile's backblast and long time of flight--10 to 20 seconds--to identify the firing position, engage it, and hope to disturb the missileman's aim. Indeed, this was Israel's response to the Sagger in 1973, and to a great extent, it worked. Now coming on line are missiles that allow an infantryman to "launch and leave," finding cover while the missile's wireless guidance takes it to the target. Moreover, the elimination of the trailing wire, which limited the speed of missiles, allows them to be much faster, giving the tank crew even less time to react.
- Terminal Homing Projectiles--Tank rounds capable of making minor directional adjustments in flight are now possible. At the defensive end, their proliferation will affect tactics in terms of movement, cover and concealment, and the concentration of formations. On the offensive side, this new technology will also impact on gunnery training. Ironically, after spending 50 to 60 years perfecting flat-shooting, high-velocity tank cannon rounds, we are now intentionally working to perfect guns that don't shoot straight.
- Increased Standoff Range--The Gulf War proved the wisdom of fighting at extended ranges, taking advantage of our cannons' long-range accuracy vis-à-vis the enemy's tank guns that were effective only at lesser ranges. A range advantage of as much as 1,000 meters resulted in very high survivability; indeed, no M1-series tank was lost to Iraqi tank cannon fire. Conversely, allied gunners were killing Iraqi tanks at ranges once considered impossible, literally at the design limit of optics and the human eye. The real success story was that gunners hit targets at ranges they had never practiced, at ranges none could ever duplicate on any allied tank range.
- Defensive Suites--Engineers in all of the major tank-building nations are now working on active defenses, literally designed to hit an incoming round before it hits you. Explosive reactive armor, first fielded by the Israelis as a defense against shaped-charge warheads, was the opening bid in this technological revolution. It is an array of steel "tiles," loaded with explosives, each capable of disrupting the warhead's jet formation before it could penetrate the tank. Taking the idea of active defense even further, the Russians have introduced their Arena system, a suite of sensors and explosive charges reportedly capable of identifying an incoming round and reacting to it within .07 seconds. Like the original explosive reactive armor, it was primarily designed to defeat shaped charges, like those on antitank missiles and rocket-propelled grenades, but would also be effective to some degree on kinetic energy penetrators.

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This Issues in ARMOR presentation opens with LTC James H. Boschma's "STAWS: New Threat from Above," an article about the developing field of top-attack weapons, their potential, and the need to train against them.

The next article covers a new weapon in the U.S. arsenal, the Javelin antitank missile, which combines "fire and forget" features with top attack capabilities. Javelin also promises to change the infantry-armor balance on the battlefield, as MAJ James K. Morningstar writes in "Javelins and Skirmishers on the Battlefield." LTC Morningstar's articles drew several letters that follow.

The long-range gunnery success of the Gulf War needs to be followed up with more realistic training of gunners, writes MAJ Paul D. Smith in his article, "The Need for Long-Range Gunnery." It covers the needed changes in training, the need for a usable training round to do this, improving tank gun zero techniques, and fire-control fine tuning. MAJ Smith's article also drew several letters which follow.

Picking up on MAJ Smith's comment that a better training round is necessary to train long-range gunnery, MAJ Steve Thorson and MAJ Bruce Held explore the engineering difficulties of designing a round that flies to a maximum training range and then decays rapidly, before "leaving the reservation." If it flies more than 8 kilometers, it's "out of the park" on any current tank range. Three ingenious techniques are explored, plus another to train the new top-attack tank rounds.

Those new rounds of "smart ammunition" are Captain Mike Pryor's subject in "M1A2s, Smart Ammunition, and Time and Space Theory," a theoretical discussion of how we can best maximize the potential of these new bullets, capable of overcoming a 10-1 disadvantage. Do the math as he does, and there's a whole new meaning to the term, "battlefield calculus."

Author SSG Stephen Krivitsky's subject is gunnery, too, but at very short ranges, like those encountered in mountainous terrain like Korea and the Balkans. The emphasis is on crew training in his "The Three to Six Second Advantage: Tank Combat in Restricted Terrain."

Finally, Adam Geibel describes Russia's Arena active protective system, which--given the likelihood of its export by the cash-poor Russians--may soon be facing our tank crews.

**Go to Next Section: Smart Top Attack Weapons**

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